Test Equipment Solutions Datasheet

Test Equipment Solutions Ltd specialise in the second user sale, rental and distribution of quality test & measurement (T&M) equipment. We stock all major equipment types such as spectrum analyzers, signal generators, oscilloscopes, power meters, logic analysers etc from all the major suppliers such as Agilent, Tektronix, Anritsu and Rohde & Schwarz.

We are focused at the professional end of the marketplace, primarily working with customers for whom high performance, quality and service are key, whilst realising the cost savings that second user equipment offers. As such, we fully test & refurbish equipment in our in-house, traceable Lab. Items are supplied with manuals, accessories and typically a full no-quibble 2 year warranty. Our staff have extensive backgrounds in T&M, totalling over 150 years of combined experience, which enables us to deliver industry-leading service and support. We endeavour to be customer focused in every way right down to the detail, such as offering free delivery on sales, covering the cost of warranty returns BOTH ways (plus supplying a loan unit, if available) and supplying a free business tool with every order.

As well as the headline benefit of cost saving, second user offers shorter lead times, higher reliability and multivendor solutions. Rental, of course, is ideal for shorter term needs and offers fast delivery, flexibility, try-before-you-buy, zero capital expenditure, lower risk and off balance sheet accounting. Both second user and rental improve the key business measure of Return On Capital Employed.

We are based near Heathrow Airport in the UK from where we supply test equipment worldwide. Our facility incorporates Sales, Support, Admin, Logistics and our own in-house Lab.

All products supplied by Test Equipment Solutions include:

- No-quibble parts & labour warranty (we provide transport for UK mainland addresses).
- Free loan equipment during warranty repair, if available.
- Full electrical, mechanical and safety refurbishment in our in-house Lab.
- Certificate of Conformance (calibration available on request).
- Manuals and accessories required for normal operation.
- Free insured delivery to your UK mainland address (sales).
- Support from our team of seasoned Test & Measurement engineers.
- ISO9001 quality assurance.

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R&S®ESL
EMI Test Receiver
Specifications

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70 Years of Driving Innovation

ROHDE&SCHWARZ

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Specifications apply under the following conditions:
15 minutes warm-up time at ambient temperature, specified environmental conditions met, calibration cycle adhered to.
Data without tolerances: typical values only. Data designated 'nominal' applies to design parameters and is not tested.

Rohde & Schwarz equipment is designed for reliable operation up to an altitude of 3000 m above sea level, and for transport up to an altitude of 4600 m above sea level.

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Frequency

Frequency range	R&S®ESL3	9 kHz to 3 GHz
	R&S®ESL6	9 kHz to 6 GHz
Frequency resolution		1 Hz

Reference frequency, internal		
Accuracy		(time since last adjustment × aging rate) + temperature drift + calibration accuracy
Aging per year	standard	1×10^{-6}
	with R&S®FSL-B4 OCXO reference frequency option	1×10^{-7}
Temperature drift (+5 °C to +45 °C)	standard	1×10^{-6}
	with R&S®FSL-B4 OCXO reference frequency option	1×10^{-7}
Max. initial calibration accuracy	standard	5×10^{-7}
	with R&S®FSL-B4 OCXO reference frequency option	5×10^{-8}

Frequency readout		
Marker resolution		1 Hz
Uncertainty		±(marker frequency × reference uncertainty + 10 % × resolution bandwidth + ½ (span / (sweep points – 1)) + 1 Hz)
Marker tuning frequency step size	default marker step size = sweep points	span / 500 span / (sweep points – 1)
Frequency counter resolution		1 Hz
Count uncertainty	S/N > 25 dB	±(frequency × reference uncertainty + ½ (last digit))
Frequency span		0 Hz, 10 Hz to 3/6 GHz
Span uncertainty		3 %

Spectral purity SSB phase noise		f = 500 MHz
Carrier offset	1 kHz	typ. –95 dBc (1 Hz)
	10 kHz	<–98 dBc (1 Hz), typ. –103 dBc (1 Hz)
	100 kHz	<–98 dBc (1 Hz), typ. –105 dBc (1 Hz)
	1 MHz	<–115 dBc (1 Hz), typ. –120 dBc (1 Hz)

Receiver scan

Scan		scan with max. 10 subranges with different settings
Measurement time per frequency		100 µs to 100 s
Number of measurement points		100000 per trace

Sweep time

Range	span = 0 Hz	1 µs to 5 µs in 125 ns steps 5 µs to 16000 s in 5 % steps
	10 Hz ≤ span ≤ 3.2 kHz	2.5 ms to 5 s/Hz × span
	3.2 kHz < span ≤ 1.5 GHz	2.5 ms to 16000 s
	1.5 GHz < span ≤ 3 GHz	5 ms to 16000 s
	span > 3 GHz	10 ms to 16000 s
Uncertainty	span = 0 Hz	nominal 0.1 %
	span ≥ 10 Hz	nominal 3 %

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IF and resolution bandwidths

IF filter and sweep filters		
3 dB bandwidths		10 Hz to 10 MHz in 1/3 sequence
	receiver mode and zero span	20 MHz additionally
Bandwidth uncertainty		nominal <3 %
Shape factor 60 dB:3 dB		nominal <5 (Gaussian type filters)

EMI filters		
6 dB bandwidths		200 Hz, 9 kHz, 120 kHz, 1MHz
Bandwidth uncertainty		nominal <3 %
Shape factor 60 dB:3 dB		nominal <6

FFT filters (analyzer mode only)		
3 dB bandwidths		1 Hz to 30 kHz in 1/3 sequence
Bandwidth uncertainty		nominal 5 %
Shape factor 60 dB:3 dB		nominal 2.5

Channel filters	
Bandwidths	100, 200, 300; 500 Hz; 1; 1.5; 2; 2.4; 2.7; 3; 3.4; 4; 4.5; 5; 6; 8.5; 9 kHz 10; 12.5; 14; 15; 16; 18 (RRC); 20; 21; 24.3 (RRC); 25; 30; 50; 100; 150; 192; 200; 300; 500 kHz 1; 1.228; 1.28 (RRC); 1.5; 2; 3;3.84 (RRC); 4.096 (RRC); 5 MHz (RRC = root raised cosine)

Video bandwidths (analyzer mode only)	1-pole lowpass RC filters	1 Hz to 10 MHz in 1/3 sequence

Signal analysis bandwidth		nominal 28 MHz

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Level

Display range		displayed noise floor to +20 dBm

Maximum rated input level		
DC voltage		50 V
CW RF power		30 dBm (= 1 W)
Peak RF power		36 dBm (= 4 W) <3 s
Max. pulse voltage		150 V
Max. pulse energy	pulse width 10 µs	10 mWs

Intermodulation		
Third-order intermodulation	intermodulation-free dynamic range, level 2 × –20 dBm, reference level –10 dBm	
	f_{in} < 30 MHz	>54 dBc (TOI +7 dBm, typ. +12 dBm)
	f_{in} ≥ 30 MHz	>60 dBc (TOI +10 dBm, typ +18 dBm)
Second harmonic intercept (SHI)	20 MHz ≤ f_{in} ≤ 3 GHz	nominal +35 dBm
1 dB compression of input mixer	0 dB RF attenuation, preamplifier = OFF, f > 200 MHz	nominal +5 dBm

Displayed average noise level (DANL, analyzer mode)		
	0 dB RF attenuation, termination 50 Ω, RBW = 1 kHz, VBW = 1 Hz, sample detector, log scaling, tracking generator OFF, normalized to 1 Hz	
	frequency	preamplifier = OFF
	9 kHz to 1 MHz	<–115 dBm (1 Hz)
	1 MHz to 10 MHz	<–120 dBm (1 Hz)
	10 MHz to 50 MHz	<–130 dBm (1 Hz)
	50 MHz to 3 GHz	<–140 dBm (1 Hz)
	3 GHz to 5 GHz	<–136 dBm (1 Hz)
	5 GHz to 6 GHz	<–130 dBm (1 Hz)
	with R&S®FSL-B22 option	
	frequency	preamplifier = ON
	9 kHz to 1 MHz	<–130 dBm (1 Hz)
	1 MHz to 10 MHz	<–135 dBm (1 Hz)
	10 MHz to 50 MHz	<–145 dBm (1 Hz)
	50 MHz to 3 GHz	<–152 dBm (1 Hz)
	3 GHz to 5 GHz	<–146 dBm (1 Hz)
	5 GHz to 6 GHz	<–140 dBm (1 Hz)
	frequency	preamplifier = ON, typical values
	500 MHz	–162 dBm (1 Hz)
	1 GHz	–160 dBm (1 Hz)
	3 GHz	–158 dBm (1 Hz)
	6 GHz	–147 dBm (1 Hz)

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Noise indication (receiver mode, nominal values, calculated from DANL data)		
	RF attenuation = 0 dB, termination = 50 Ω, average (AV) detector, tracking generator = OFF	
	frequency	preamplifier = OFF
	9 kHz to 150 kHz, BW = 200 Hz	<15 dBµV
	150 kHz to 1 MHz, BW = 9 kHz	<32 dBµV
	1 MHz to 10 MHz, BW = 9 kHz	<27 dBµV
	10 MHz to 30 MHz, BW = 9 kHz	<17 dBµV
	30 MHz to 50 MHz, BW = 120 kHz	<28 dBµV
	50 MHz to 1 GHz, BW = 120 kHz	<18 dBµV
	1 GHz to 3 GHz, BW = 1 MHz	<27 dBµV
	3 GHz to 5 GHz, BW = 1 MHz	<31 dBµV
	5 GHz to 6 GHz, BW = 1 MHz	<37 dBµV
	with R&S®FSL-B22 option	
	frequency	preamplifier = ON
	9 kHz to 150 kHz, BW = 200 Hz	<0 dBµV
	150 kHz to 1 MHz, BW = 9 kHz	<17 dBµV
	1 MHz to 10 MHz, BW = 9 kHz	<12 dBµV
	10 MHz to 30 MHz, BW = 9 kHz	<2 dBµV
	30 MHz to 50 MHz, BW = 120 kHz	<13 dBµV
	50 MHz to 1 GHz, BW = 120 kHz	<6 dBµV
	1 GHz to 3 GHz, BW = 1 MHz	<15 dBµV
	3 GHz to 5 GHz, BW = 1 MHz	<21 dBµV
	5 GHz to 6 GHz, BW = 1 MHz	<27 dBµV
	frequency	preamplifier = ON, typical values
	500 MHz, BW = 120 kHz	<–4dBµV
	1 GHz, BW = 120 kHz	<–2 dBµV
	3 GHz, BW = 1 MHz	<9 dBµV
	6 GHz, BW = 1 MHz	<20dBµV
Increase of DANL relative to AV display	max. peak	typ. +11 dB
	RMS	typ. +1 dB
	quasi peak	
	band A	typ. +3 dB
	band B	typ. +4 dB
	bands C and D	typ. +6 dB

Spurious responses		
Image response	f_{in} – 2 × 48.375 MHz	<–80 dBc, typ. –90 dBc
	f_{in} – 2 × 838.375 MHz	<–80 dBc, typ. –90 dBc
	f_{in} – 2 × 7158.375 MHz	typ. –60 dBc
Intermediate frequency response	48.375 MHz, 838.375 MHz, 7158.375 MHz	<–60 dBc, typ. –80 dBc
Residual spurious response	f > 30 MHz, without input signal, RF attenuation = 0 dB, RBW ≤ 10 kHz	<–90 dBm
Local oscillator related spurious response	offset from carrier <100 kHz	typ. –60 dBc
	offset from carrier ≥100 kHz	<–60 dBc
Other interfering signals:		
A/D conversion related spurious response		typ. <–70 dBc
Subharmonic of 1st LO	spur at 7158.375 MHz – 2 × f_{in}	typ. –60 dBc
Harmonic of 1st LO	mixer level <–10 dBm (spur at f_{in} – 3579.1875 MHz)	typ. –60 dBc

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Level display (analyzer mode)		
Logarithmic level axis		10 dB to 100 dB
Linear level axis		0 % to 100 %/10 divisions
Number of traces		4
Trace detectors		max. peak, min. peak, auto peak, sample, RMS, CISPR-AV, CISPR-RMS quasi peak, average
Number of measurement points	default value	501
	range	125 to 32001 in steps of about a factor of 2
Trace functions		clear/write, max. hold, average, min. hold, view
Setting range of reference level	logarithmic level display	–80 dBm to 20 dBm in steps of 2 dB, 5 dB or 10 dB
	linear level display	–80 dBm to 20 dBm, 0 % to 100 %
Units of level axis	logarithmic level display	dBm, dBmV, dBµV, dBµA, dBpW
	linear level display	µV, mV, V, µA, mA, A, pW, nW, µW, mW, W

Level display (receiver mode)		
Screen		bargraph display + diagram
Level display	digital	numeric; 0.01 dB resolution
	analog	bargraph display, separately for each detector
Detectors	max. 4 selectable	max. peak, min. peak, RMS, average, CISPR-AV, CISPR-RMS, quasi peak
EMI detectors	quasi peak, CISPR-AV, CISPR-RMS	weighting in line with CISPR 16-1-1
Measurement time	selectable	50 µs to 100 s
Units of level axis	logarithmic level display	dBm, dBµV, dBmV, dBµA, dBpW, dBpT
RF spectrum		
Logarithmic level axis		10 dB to 200 dB, in steps of 10
Frequency axis	selectable	linear or logarithmic
Number of traces		6

Level measurement uncertainty		
	95 % confidence level, +20 °C to +30 °C, S/N >16 dB, 0 dB to –50 dB from reference level	
	10 MHz < f ≤ 3 GHz	<0.5 dB
	3 GHz < f ≤ 6 GHz	<0.8 dB
Absolute uncertainty at 65.83 MHz		<0.3 dB
Frequency response (+20 °C to +30 °C)	9 kHz ≤ f < 30 kHz	nominal 1.5 dB
	30 kHz ≤ f ≤ 3 GHz	<0.5 dB, typ. 0.3 dB
	3 GHz < f ≤ 6 GHz	<0.8 dB, typ. 0.3 dB
Attenuator uncertainty		<0.3 dB
Uncertainty of reference level setting		nominal <0.1 dB

Display nonlinearity		
Logarithmic level display	S/N >16 dB 0 dB to –50 dB	<0.2 dB
Bandwidth switching uncertainty	reference: RBW = 10 kHz	nominal <0.1 dB

Trigger functions

Trigger		
Trigger source		free run, video, external, IF power
External trigger level		TTL level

I/Q data

Interface		LAN
	R&S®FSL-B10	LAN or GPIB
Memory length		max. 512 ksample I and Q
Sample rate		10 kHz to 65.8 MHz
Signal bandwidth	sample rate 65.8 MHz	nominal 28 MHz

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Inputs and outputs

RF input		
Impedance		50 Ω
Connector		N female
VSWR	RF attenuation ≥ 10 dB	
	10 MHz ≤ f ≤ 1 GHz	nominal 1.2
	1 GHz < f ≤ 6 GHz	nominal 1.5
Input attenuator		0 dB to 50 dB in 5 dB steps

AF output		
Connector		3.5 mm mini jack
Output impedance		<100 Ω
Open-circuit voltage		up to 1.5 V, adjustable

Tracking generator		
Tracking generator	models .13 and .16 only	N female, 50 Ω
Output level		–50 dBm to 0 dBm in 1 dB steps
Frequency range		1 MHz to 3 GHz/6 GHz
Dynamic range	RF attenuation = 0 dB, source power 0 dBm	
	10 MHz to 2 GHz	nominal 80 dB
	2 GHz to f_{max}	nominal 60 dB
Reverse power		
DC voltage		50 V
CW RF power		30 dBm (= 1 W)
Max. pulse voltage		150 V
Max. pulse energy (10 µs)		10 mWs

External reference		
Connector		BNC female, 50 Ω
Input level		0 dBm to +10 dBm
Output level	with R&S®FSL-B4	typ. 0 dBm
Frequency		10 MHz ±5 ppm

External trigger/gate input		
Connector		BNC female, 50 Ω
Input level		TTL-compatible

Probe power		
		+15 V DC, –12.6 V DC and ground, max. 150 mA, nominal

External monitor		
Connector		DVI-D

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General data

Remote control		
LAN interface		10/100BaseT, RJ-45
IEC/IEEE bus (GPIB)	R&S®FSL-B10	SCPI 1997.0

Display		
Resolution		640 × 480 pixels
Pixel failure rate		$<2 \times 10^{-5}$

Mass memory		
Mass memory		flash disk (internal), USB memory stick (not supplied)
Data storage		>500 instrument settings and traces

Temperature		
Operating temperature range		+0 °C to +50 °C
Permissible temperature range		+0 °C to +55 °C
Storage temperature range		–40 °C to +70 °C
Climatic loading		+25 °C/+40 °C at 85 % relative humidity (IEC 60068-2-30)

Mechanical resistance		
Vibration	sinusoidal	IEC 60068-2-6
	random	IEC 60068-2-64
Shock		40 g shock spectrum, in line with MIL-STD-810E, method 516.4 procedure 1, IEC 60068-2-27

Power supply		
Input voltage range, AC, nominal		100 V to 240 V
AC supply frequency		50 Hz to 400 Hz
Input current, AC		0.9 A to 0.3 A
Input voltage range, DC, nominal	R&S®FSL-B30	10 V to 28 V
Input current, DC	R&S®FSL-B30	8.0 A to 2.2 A
Power consumption		typ. 45 W, max. 65 W with all options
Safety		IEC 61010-1, EN 61010-1, UL 61010B-1, CSA C22.2 No. 1010-1
Test mark		VDE, GS, CSA, CSA-NRTL
EMC		EMC Directive 2004/108/EC including: EN 61326 class B (emission) CISPR 11/EN 55011/group 1 class B (emission) EN 61326 table A.1 (immunity, industrial)
Dimensions (W × H × D)	with handle	408.8 mm × 158.1 mm × 465.3 mm (16.09 in × 6.22 in × 18.32 in)
	without handle	342.3 mm × 158.1 mm × 367.0 mm (13.48 in × 6.22 in × 14.45 in)
Weight	without options	<7 kg (<15.43 lb)
	with battery pack	<8 kg (<17.64 lb)

Recommended calibration interval		1 year
	operation with external reference	2 years

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R&S®FSL-B5 additional interfaces

User port		
Connector		9-pin D-Sub male
Output		TTL-compatible, 0 V/5 V max. 15 mA
Input		TTL-compatible, max. 5 V

Noise source control		
Connector		BNC female
Output		0 V/28 V, max. 100 mA, switchable, supply for noise source

Power sensor		
Connector		6-pin LEMOSA female for supported R&S®NRP-Zxx power sensors

IF/video out		
Connector		BNC female, 50 Ω
IF out		
Bandwidth		nominal 28 MHz
IF frequency	RBW 20 MHz, center frequency >20 MHz, span 0 Hz	17.45833 MHz (nominal) ±2 MHz, dependent on center frequency
Output level (gain versus RF input)	RF attenuation 0 dB, RF preamplifier = OFF, span 0 Hz, RBW 20 MHz	
	center frequency	
	100 MHz	approx. +3 dB
	3 GHz	approx. –1 dB
	6 GHz	approx. –7 dB
Video out		
Bandwidth		equal to VBW setting, max. RBW/2
Output scaling		log scaling with display scale set to log, lin scaling with display scale set to lin
Output level	center frequency >10 MHz, span 0 Hz, signal at reference level and center frequency	
	video 1 V	1 V ±10 % (open circuit) (nominal)
	video 200 mV	200 mV ±10 % (open circuit) (nominal)

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R&S®FSL-K7 AM/FM/φM measurement demodulator

Measurement of analog modulation signals		
Demodulation bandwidth		100 Hz to 6.4 kHz, binary steps 12.5 kHz to 1.6 MHz, binary steps 3 MHz, 5 MHz, 8 MHz, 10 MHz, 18 MHz
Recording length	maximum	512 ksample
Recording time	demodulation bandwidth	
	100 Hz	3276.8 s
	6.4 kHz	51.2 s
	12.5 kHz	26.6 s
	1.6 MHz	200 ms
	3 MHz	100 ms
	5 MHz	50 ms
	8 MHz	25 ms
	10 MHz	12.5 ms
	18 MHz	12.5 ms
Display	frequency versus time (FM), amplitude versus time (AM), phase versus time (φM), RF power versus time, RF spectrum (FFT), AF spectrum (FFT), table with numeric values for: modulation deviation (peak, RMS), modulation frequency, carrier offset, carrier power (power of unmodulated carrier), THD, SINAD	

AF (modulation frequency)		
Range		≤9 MHz max. 0.5 × demodulation bandwidth
Resolution		5 digits
Measurement uncertainty		0.1 %
AF filters		
Lowpass		3 kHz, 15 kHz, 150 kHz, 5 %, 10 %, 25 % of demodulation bandwidth
Highpass		50 Hz, 300 Hz
Deemphasis		25 µs, 50 µs, 75 µs, 750 µs

AM demodulation		
Measurement range	modulation depth	0 % to 100 %
Modulation depth uncertainty	AF ≤ 1 MHz	<3 % of reading + residual AM
Residual AM	demodulation bandwidth ≤200 kHz, RMS, RF ≤ 3 GHz, RF input level ≥ (RF attenuation/dB – 30) dBm	0.2 %
Distortion	10 Hz ≤ AF ≤ 100 kHz	0.3 %
FM rejection	AF ≤ 1 MHz and AF + deviation ≤ 0.5 × demodulation bandwidth	typ. 1 % + residual AM

FM demodulation		
Measurement range	frequency deviation	≤9 MHz
Deviation uncertainty	AF ≤ 1 MHz and AF + deviation ≤ 0.5 × demodulation bandwidth	<3 % of reading + residual FM
Residual FM	demodulation bandwidth ≤100 kHz, RMS, RF input level ≥ (RF attenuation/dB –30) dBm	
	RF ≤ 1 GHz	150 Hz
	RF = 3 GHz	200 Hz
Distortion	10 Hz ≤ AF ≤ 100 kHz, deviation < 400 kHz	0.3 %
AM rejection	100 Hz ≤ AF ≤ 1 kHz, modulation depth 50 %	30 Hz

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φM demodulation		
AF		≤5 MHz, max. 0.5 × demodulation bandwidth
Measurement range	phase deviation	<1000 rad
Residual φM	demodulation bandwidth ≤100 kHz, RMS, RF = 1 GHz, highpass 300 Hz, RF input level ≥ (RF attenuation/dB – 30 dBm)	5 mrad

Carrier power versus time		
Display range		noise floor to +20 dBm
Measurement uncertainty	unmodulated carrier, S/N > 16 dB, RF: 50 kHz to 3 GHz	typ. 1 dB
Maximum dynamic range	demodulation bandwidth 200 kHz	typ. 75 dB
Display linearity	S/N > 16 dB	typ. 0.2 dB

AF spectrum		
Span		≤9 MHz
Resolution bandwidth		1 Hz to 10 MHz

RF spectrum		
Span		≤18 MHz
Resolution bandwidth		1 Hz to 10 MHz
Shape factor	60 dB:3 dB	2.5, nominal

Modulation distortion		
Measurement functions		THD, SINAD
Measurement range		–100 dB to 0 dB
Resolution		0.01 dB
Measurement uncertainty		typ. 0.5 dB
AF frequency range		10 Hz to 5 MHz

Trigger		
Trigger functions		RF level, AM, FM, φM demodulation

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R&S®FSL-K30 application firmware for noise figure and gain measurements

Frequency

Frequency range	R&S®ESL3	100 kHz to 3 GHz
	R&S®ESL6	100 kHz to 6 GHz

Measurement bandwidth		10 Hz to 10 MHz (–3 dB) in 1/3 sequence

Noise figure and gain measurement

Noise figure		
Measurement range		0 dB to 35 dB
Resolution		0.01 dB
Accuracy	instrument uncertainty (95 % confidence level)	
	frequency range 100 kHz to 10 MHz	
	measurement with external preamplifier (gain 50 dB, noise figure <5 dB), RBW <10 kHz, DUT noise figure 1 dB to 10 dB and gain >10 dB	0.3 dB
	frequency range >10 MHz to 6 GHz	
	measurement with external preamplifier (gain 30 dB, noise figure <5 dB), RBW 1 MHz, DUT noise figure 1 dB to 10 dB and gain >10 dB	0.3 dB
	R&S®FSL-B22 (internal preamplifier) active, measurement with external preamplifier (gain 20 dB, noise figure <5 dB), RBW 1 MHz, DUT noise figure 1 dB to 10 dB and gain >10 dB	0.3 dB

Gain		
Measurement range		0 dB to 60 dB
Resolution		0.01 dB
Accuracy	frequency range 100 kHz to 10 MHz	
	measurement with external preamplifier (gain 50 dB, noise figure <5 dB), RBW <10 kHz	0.2 dB
	frequency range >10 MHz to 6 GHz	
	measurement with external preamplifier (gain 30 dB, noise figure <5 dB), RBW 1 MHz	0.2 dB

Required hardware

Spectrum analyzer		
Noise source supply	via 28 V connector on rear panel of R&S®FSL	R&S®FSL-B5
Noise source	recommendation	NoiseCom NC346
Preamplifier, external	frequency range 100 kHz to 3/6 GHz	gain approx. 30 dB, noise figure max. 5 dB

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Ordering information

Designation	Type	Order No.
Test Receiver, 9 kHz to 3 GHz	R&S®ESL3	1300.1501.03
Test Receiver, 9 kHz to 3 GHz, with tracking generator	R&S®ESL3	1300.1501.13
Test Receiver, 9 kHz to 6 GHz	R&S®ESL6	1300.1501.06
Test Receiver, 9 kHz to 6 GHz, with tracking generator	R&S®ESL6	1300.1501.16
Accessories supplied		
Power cable, quick start guide and CD-ROM (with operating manual and service manual)		
Recommended extras		
Printed manual (includes operating manual and service manual)		1300.5053.32

Options

Designation	Type	Order No.	Retrofittable	Remarks
Options				
OCXO Reference Frequency	R&S®FSL-B4	1300.6008.02	yes	
Additional Interfaces	R&S®FSL-B5	1300.6108.02	yes	video out, IF out, noise source control, AUX port, R&S®NRP-Zx power sensor
Gated Sweep	R&S®FSL-B8	1300.5701.02	yes	
GPIB Interface	R&S®FSL-B10	1300.6208.02	yes	
RF Preamplifier (3/6 GHz)	R&S®FSL-B22	1300.5953.02	yes	
DC Power Supply	R&S®FSL-B30	1300.6308.02	yes	
NiMH Battery Pack	R&S®FSL-B31	1300.6408.02	yes	requires R&S®FSL-B30
Firmware/Software				
AM/FM/φM Measurement Demodulator	R&S®FSL-K7	1301.9246.02		
Power Sensor Support	R&S®FSL-K9	1301.9530.02		requires R&S®FSL-B5 or R&S®NRP-Z3/4
Application Firmware for Noise Figure and Gain Measurements	R&S®FSL-K30	1301.9817.02		requires R&S®FSL-B5 and preamplifier

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Recommended extras

Order designation	Type	Order No.
19'' Rackmount Adapter	R&S®ZZA-S334	1109.4487.00
Soft Carrying Bag	R&S®FSL-Z3	1300.5401.00
Protective Hard Cover	R&S®EVS-Z6	5201.7760.00
Additional Charger Unit	R&S®FSL-Z4	1300.5430.02
Matching Pad 75 Ω, L section	R&S®RAM	0358.5414.02
Matching Pad 75 Ω, series resistor 25 Ω	R&S®RAZ	0358.5714.02
Matching Pad 75 Ω, L section, N to BNC	R&S®FSH-Z38	1300.7740.02

Power sensors supported by the R&S®FSL-K9

Order designation	Type	Order No.
Average Power Sensor 10 MHz to 8 GHz, 200 mW	R&S®NRP-Z11	1138.3004.02
Average Power Sensor 10 MHz to 18 GHz, 200 mW	R&S®NRP-Z21	1137.6000.02
Average Power Sensor 10 MHz to 18 GHz, 2 W	R&S®NRP-Z22	1137.7506.02
Average Power Sensor 10 MHz to 18 GHz, 15 W	R&S®NRP-Z23	1137.8002.02
Average Power Sensor 10 MHz to 18 GHz, 30 W	R&S®NRP-Z24	1137.8502.02
Power Sensor Module with Power Splitter DC to 18 GHz, 500 mW	R&S®NRP-Z27	1169.4102.02
Power Sensor Module with Power Splitter DC to 26.5 GHz, 500 mW	R&S®NRP-Z37	1169.3206.02
Average Power Sensor 9 kHz to 6 GHz, 200 mW	R&S®NRP-Z91	1168.8004.02
Thermal Power Sensor 0 Hz to 18 GHz, 100 mW	R&S®NRP-Z51	1138.0005.02
Thermal Power Sensor 0 Hz to 40 GHz, 100 mW	R&S®NRP-Z55	1138.2008.02
Wideband Power Sensor 50 MHz to 18 GHz, 100 mW	R&S®NRP-Z81	1137.9009.02

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